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Canada Goose Nesting Performance along the Hanford Reach of the Columbia River, 1971-1981

Abstract

Clutch size observed in 1215 hatched Great Basin Canada Goose (*Branta canadensis moffitti*) nests from 1971-1981 was 5.6. The average percent of successful nests was 82 percent. A mean of 135 nests per year since 1971 is lower than the 215 nests per year observed during 1953-1970. Loss of nesting due to coyote predation on Locke Island—#6 has accounted for the overall drop in number of nests.

Introduction

The Hanford nesting population of the Canada Goose has been studied since 1950. Hanson and Eberhardt (1971) have discussed the 1953-1970 period in great detail. This report examines data collected from 1971 to 1981 and continues a record of an important nesting population of the Great Basin Canada Goose. One of the initial purposes of these studies was to document the reproductive performance of the goose population, and this aspect of the investigation has continued to determine whether nesting performance would demonstrate a delayed response to nuclear reactor operations. Radionuclide content of Canada goose eggs measured after the closure of the production reactors indicated that the radionuclide content of goose eggs taken from deserted nests along the Hanford reach was low and primarily of worldwide fallout origin (Rickard and Sweany 1977).

Continuous documentation of nesting performance also provides a way to evaluate the effect of future industrial uses of Columbia River water and any habitat changes induced by hydroelectric dams and turbine additions up and downstream from the Hanford reach. The proposed establishment of a commercial nuclear power reactor "park" at the Hanford Site to produce electricity for export to the regional power network could also produce a number of environmental changes that could affect the nesting goose population as well as other wildlife populations. A hydroelectric dam across the Hanford reach would inundate the islands upon which the nesting goose population depends. The recent opening of the entire length of the Hanford Reach to public recreational use is another feature that could have deleterious effect on the nesting geese. Sequentially collected data can serve as a way to evaluate the effects of past environmental changes and perhaps to recommend future mitigation practices to help maintain a diminishing wildlife resource in south-central Washington.

Study Area

The Hanford Reach (Figure 1) contains the only free-flowing portion of the Columbia

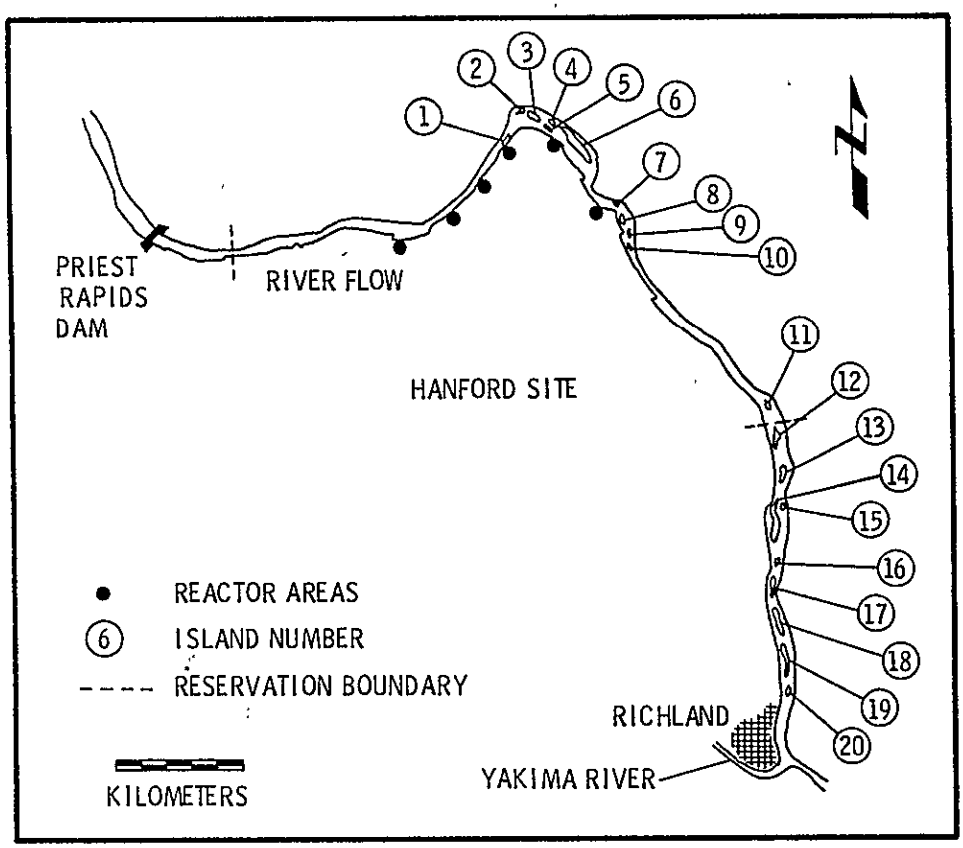

Figure 1. The Hanford reach of the Columbia River, showing locations of 20 islands used for nesting by Canada Geese.

River in the United States upstream from Bonneville Dam. The riparian and aquatic habitats represent relatively unmanaged ecological resources.

Twenty islands provide almost all of the goose nesting habitats along the Hanford Reach (Hanson and Eberhardt 1971). Some of these islands have changed vegetatively since 1970, particularly Islands 18, 19, and 20, as a result of pool elevations of Lake Wallulla, the impoundment created by McNary Dam in 1955. Here the establishment of tree and shrub willows (*Salix* spp, and rank herbaceous species rooted in soil and mud substrates; e.g., reed canary grass (*Phalaris arundinacea*)) have replaced the sparse, short-statured plant communities rooted in cobble stones and gravels which were adapted to the historical seasonal flooding regime and the rapid flows of the free-flowing Columbia River (Fickeisen *et al.* 1980). Locke Island (#6, Fig. 1) has also been grazed by a small resident herd of feral cattle, and Island #13 was burned by human carelessness.

Methods

Nesting surveys during 1971-1981 were conducted biweekly and usually began during the first week of April, as described by Hanson and Eberhardt (1971). Prior to 1971, nesting surveys were conducted weekly, thus not all parameters measured in the earlier

surveys can be compared to the post-1970 data base. We feel, however, that the nest performance parameters we have selected are generally comparable to those of earlier investigations and serve to extend the period of observation an additional 10 years. Certain parameters, such as nesting phenology, nesting success, and fates of eggs, are sensitive to the frequency of observation periods and probably differ slightly from pre-1970 data.

Results and Discussion

The annual number of goose nests on each island can be an effective measure of the changing status of the population. However, other parameters such as nest success, number of eggs laid in successful nests, and average clutch sizes also provide useful information (Table 1) on the reproductive potential. The parameter "nesting success" as we use it, means that a nest was successful if it contained the shells and membranes of hatched eggs, filoplumes from natal down, pipped eggs, or goslings (Hanson and Eberhardt 1971). Average clutch size is the average clutches from all successful nests. We compare productivity data in Table 1 with Hanson and Eberhardt's (1971) figures for the same parameters. In 1215 hatched nests from 1971-1981 we observed a mean clutch size of 5.6. The average percent of successful nests reported by Hanson and Eberhardt was 71 percent, while our value was 82 percent. The generally higher values we report for success probably reflect the biweekly frequency of nest checks. The potential for the goose population to reach the 1958 level is apparently still present based on productivity parameters.

TABLE 1. Productivity of Canada Goose nests on the Hanford Reach of the Columbia River, 1971 to 1980.

Year	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	Avg.
Total nests	112	160	127	146	108	111	125	141	136	156	166	135
Number of successful nests	99	133	116	111	98	100	78	112	113	111	144	110
Percent successful nests	88	83	91	76	91	90	62	79	83	71	87	82
No. of eggs in successful nests	566	741	643	582	528	536	455	644	649	607	883	620
Average clutch size	5.7	5.6	5.5	5.2	5.4	5.4	5.8	5.8	5.7	6.6	6.1	5.6

The number of goose nests established on the Hanford reach islands has fluctuated from year to year, but a general decline in overall numbers is evident. More than 300 goose nests were present in 1958, but in 1975 only 108 nests were counted (Fig. 2). This observed decline in the number of nesting attempts, we believe, is due to a combination of factors, with the common coyote (*Canis latrans*) assigned an important role in the decline. The displacement of a resident human population from the reach of the Columbia in 1943 was initially beneficial to the goose population, by reducing human visitations to the islands. This kind of site management also benefitted the coyote population by providing a release from control measures.

The most dramatic effect of the coyote on the goose population is illustrated for Locke Island (Island #6), which has 106 acres and is the largest of the islands (Fig. 3). In 1957, Locke Island supported at least 129 goose nests (Hanson and Eberhardt 1971). The first evidence of coyote invasion of the island was recorded in 1959, when 42 of 96 nests were destroyed (Hanson and Eberhardt 1971). The second coyote incident

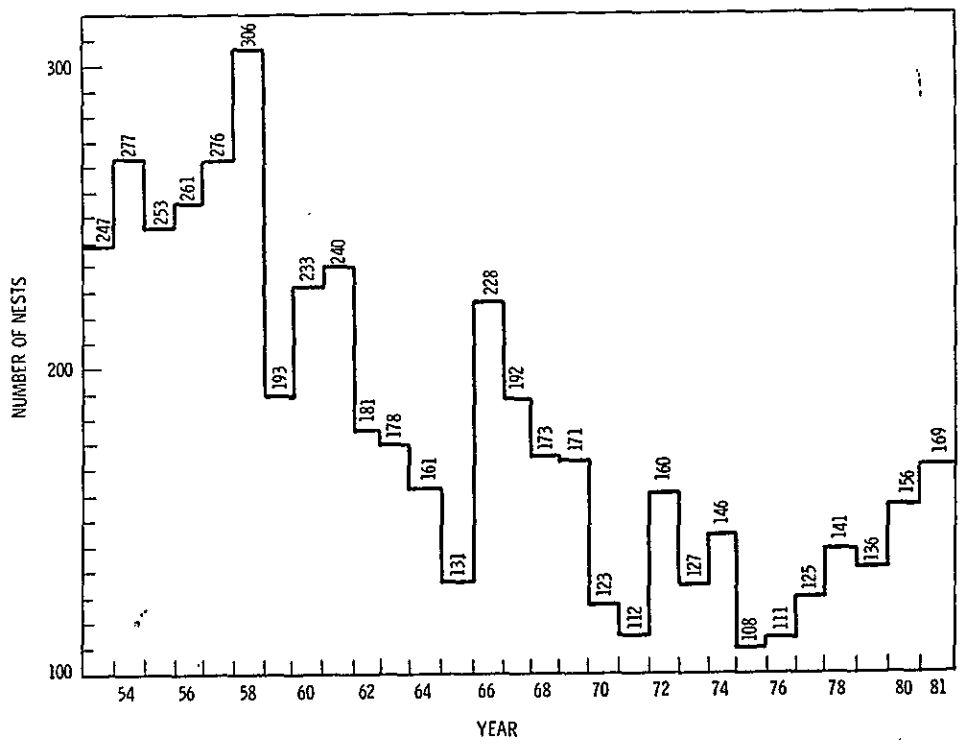

Figure 2. Number of Canada Goose nests found on the Hanford Reach, 1954-1981.

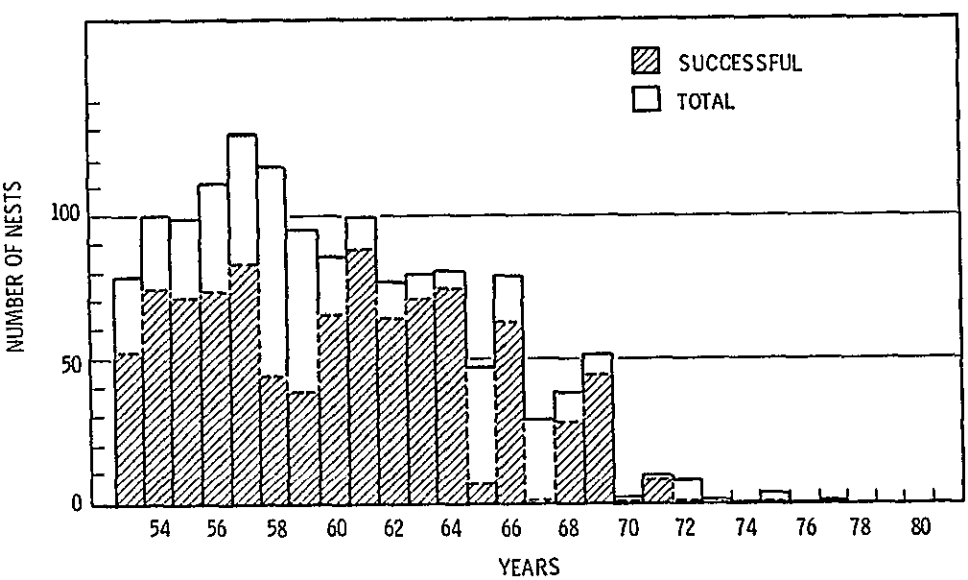

Figure 3. Number of Canada Goose nests established on Island 6 (Locke Island), Hanford Reservation and the number of successful nests, 1953-1981.

occurred in 1965, when a single coyote killed seven geese, destroyed eleven nests, and was probably responsible for the desertion of 28 nests. In the fall of 1966, two coyotes took residence on the island, resulting in the failure of all but one of 27 nests during the 1967 nesting season. In February 1968, two coyotes were shot, and the number of goose nests slightly increased that same year. Since 1970, coyotes have been more or less permanent residents on Locke Island, and coyote removal was not practiced again until 1978. By 1980 the Game Department had killed 159 coyotes along the Hanford Reach (D. Flohr, pers. comm.). Nesting geese are still absent from Locke Island, while coyotes continue to persist. In fact, a family of coyotes has taken up residence on the island despite efforts to control them. Clearly, the survival of this coyote family shows that "general" coyote control is ineffective and that the Locke Island situation emphasizes the importance of individual animals as predators. Hanson and Eberhardt (1971) noted the same predator situation in their study and pointed out that an indiscriminate coyote suppression program conducted during their study provided no increase of the nesting Canada Goose population. Locke Island has also undergone some changes in plant community composition in the past decade by grazing of feral cattle. Cheatgrass (*Bromus tectorum*) now dominates much of the island formerly dominated by native dryland perennial forbs and grasses. These vegetative changes may have had some effect on goose nesting, but the overriding factor has clearly been the presence of coyotes on the island during the nesting season.

To better understand the importance of Locke Island, one need only to examine the total number of nests observed on the Hanford Reach island since 1953. The mean of 135 nests per year since 1971 is lower than 215 nests per year observed during 1953-1970 (Hanson and Eberhardt 1970). This decrease coincides with the near complete termination of nesting on Islands 3, 4, 6, 8, 10, 13, 14 (Dewaard 1981). These islands supported 51 percent of total nests during 1953-1970 but less than 4 percent since 1970. Island 6 supported 37 percent of the total nests prior to 1970 but less than 2 percent since then. DeWaard (1981) analyzed Battelle's data set on Canada Goose nesting performance, eliminating Island 6 in his analysis. He found annual means of 136 (S.E. = 7) and 128 (S.E. = 5) nests per year during 1953-1970 and 1971-1981, respectively. These means were not significantly different ($t = 0.792$, 24 df, $P > 0.40$). Loss of nesting on Island 6 alone clearly accounts for the overall drop in number of nests over the entire study area.

Since the Canada Goose nesting population appears to be fluctuating around 130 nests per year, we can assume that the Hanford islands are supporting the maximum number of nesting geese. The average clutch size and percent successful nests have remained nearly unchanged from the 1953-1970 to 1971-1981 periods, indicating that the local goose population is reproductively healthy. An increase in total production of geese, however, is not expected unless nesting on Island 6 is restored to levels present in the early 1960s.

Acknowledgments

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